

EXECUTIVE SUMMARY

In 1998, an informal consultation group was formed by Canadian and U.S. governments to address air quality complaints and concerns that had been expressed by people living in and around the Sault Ste. Marie area. In particular, people living in Sault Ste. Marie, Michigan had expressed concerns to the U.S. government about visible emissions from the Algoma Steel Inc. mill located in Sault Ste. Marie, Ontario which could be crossing the border and creating unhealthful air quality in Michigan where they live.

It was decided to establish a group under the auspices of the Canada-U.S. Air Quality Agreement where work could be done to better understand the air quality in the Sault Ste. Marie region and the impact of emissions from the steel company and other facilities on the Sault area. To help achieve this goal, air quality monitoring was established by the U.S. in Sault Ste. Marie, Michigan to complement the on-going Canadian Ontario Ministry of Environment air quality monitoring program in Sault Ste. Marie, Ontario.

The Technical Support Document on Air Quality 2001-2003 for the Informal Consultation on Local Air Issues in Sault Ste. Marie, Ontario-Michigan under the Canada-United States Air Quality Agreement is the first report on the air quality monitoring results for the combined air quality networks for the period 2001 to 2003. It also provides information on U.S., Canadian and Ontario standards for air quality; the air contaminants monitored, along with likely sources, impacts, monitoring methods, available emission inventories and trends; recent and future air pollution abatement efforts for major air emitters in Sault Ste. Marie, Ontario and it makes recommendations on possible modifications to the monitoring program based on the findings to-date.

The air quality monitoring network is made up of two sites in Michigan and five sites in Ontario. The monitors measure air pollutants emitted by local industries, cars, ships and other sources as well as pollutants that are carried by the wind through the atmosphere from other places upwind. The monitors in the Sault Ste. Marie Ontario-Michigan area were set up to measure a number of pollutants that experts decided were most important to understand. This includes those released directly to the air such as various sizes of particulate, metals, volatile organic compounds (VOCs) polycyclic aromatic hydrocarbons (PAHs), sulphur dioxide (SO₂), nitrogen oxides (NO_x) and total reduced sulphur (TRS) compounds; and pollutants that are formed in the atmosphere such as ground-level ozone (O₃) or summertime smog.

To understand what the monitoring results mean in terms of air quality and health, governments have established concentration levels for these pollutants in air above which health and air quality may be compromised. The technical support document lists all of the relevant U.S., Canadian and Ontario targets¹: depending on which government has established them, they may be called air quality standards, air quality criteria, or health benchmarks. When a particular pollutant is exceeding a government's target level, this

¹ It should be noted that air quality targets established for Canada, the U.S. and Ontario are not necessarily the same.

information is used when working with the responsible industry to reduce air pollution in the area.¹

The following is a summary of the information collected by the monitors in Sault Ste. Marie, Ontario-Michigan during the 2001-2003 monitoring period:

Particles in the air can be a problem in terms of soiling if they are large and visible (dustfall and total suspended particulate (TSP)) and a health concern if they are very small (particulates classified as less than 10 or 2.5 micrograms (μm) – PM_{10} and $\text{PM}_{2.5}$). The monitoring stations in Ontario and Michigan looked at both large and small particles. With respect to the largest particles – dustfall and TSP – the monitors showed that pollution associated with steel and coke-making resulted in multiple exceedences of air quality criteria in Ontario and one in Michigan. With respect to the smaller particles that are associated with health concerns, PM_{10} and $\text{PM}_{2.5}$, the information collected was insufficient to tell the story conclusively. However, with the limited data collected, it appeared that the U.S. standards for these pollutants were not being exceeded in either Ontario or Michigan. The monitoring period was not long enough to determine whether the level of Canada's standard for $\text{PM}_{2.5}$ was being exceeded or not.

With respect to metals, VOCs and PAHs, some of which are known or suspected to cause cancer or have other health effects, the monitors found the following levels of pollutants.

- No metals were found to exceed Ontario's air quality criteria levels at any of the monitors in either Ontario or Michigan.
- Lead levels did not exceed the U.S. air quality standard for lead at any of the monitors.
- The annual average concentrations of manganese at both Ontario sites were higher than the U.S. benchmark level for non-cancer health risks².
- The annual average concentration of total chromium is near the U.S. cancer risk benchmark³. However, the monitoring methods used do not allow a definite measurement of the most toxic components of chromium. The assumption, then, that all the measured chromium is of the most toxic variety leads to conservative estimates of the related cancer risk.
- Although the data set from the monitors is small, preliminary conclusions are that in Michigan, the concentration of PAHs were below the U.S. cancer risk benchmark and that the concentration of the PAH benzo(a)pyrene was below Ontario's air quality criteria. However, this was not the case at the Ontario monitors where exceedences of Ontario's benzo(a)pyrene air quality criteria were reported each year. Further, at the Bonney Street site, monitors showed the PAH benzo(a)pyrene was measured at levels that were at the U.S. cancer risk benchmark.

² The U.S. noncancer risk benchmark is a pollutant level believed to be without negative health effects for a person exposed over a lifetime. Pollutant exposures notably higher than the benchmark are increasingly likely to cause breathing difficulties, nervous system effects, or contribute to other noncancer health effects.

³ The U.S. cancer risk benchmark is set at a level that may potentially contribute to one excess cancer case per million population over a lifetime of exposure. This benchmark level is considered safe, however, large exceedences may pose greater risks and indicate a need for further investigation or pollution reductions.

- The levels of the VOCs measured were all within Ontario's air quality criteria levels at the Ontario sites with the exception of acrylonitrile, which marginally exceeded the Ontario air quality criteria level in 2001 at the Merrifield School site. At the Bonney Street site, the 3-year average for naphthalene was slightly higher than the U.S. non-cancer benchmark.
- Typical of most urban and rural areas in North America, the average benzene and carbon tetrachloride concentrations were above the U.S. cancer risk benchmark for cancer risk at all sites. The average concentrations at the Bonney Street monitor were considerably higher than at the other sites and potential health effects are greater in this area. At the Ontario monitors, concentrations of acrylonitrile, 1,3-butadiene and 1,2-dichloroethane (at Bonney Street) were at the U.S. health risk benchmark. The data collected at the Michigan monitoring site was small and its assessment was preliminary.

In terms of the gases that are released directly to the air such as sulphur dioxide (SO₂), nitrogen oxides (NO_x) and total reduced sulphur (TRS) compounds and gases that are formed in the atmosphere such as ground-level ozone (O₃) or summertime smog, the monitors showed the following information for the 2001-2003 period:

- The SO₂ data collected at the Merrifield School site did not exceed any of the Ontario, Canada or U.S. objectives and standards.
- The TRS concentrations were below the Ontario air quality criteria at the Merrifield School site but at the Bonney Street site there were a number of exceedences of the hourly criteria during the study period.
- The concentrations of NO_x were well within the Ontario, Canada and U.S. objectives and standards.
- The ozone air quality criterion was exceeded twice each year of the study period. This was one of the lowest exceedence rates for urban centres in the province and concentrations were comparable to those measured in other northern Ontario urban centres. During the study period, four smog advisories were issued for the district of Algoma.
- From 2001 to 2003, the Air Quality Index system described the air quality in Sault Ste. Marie, Ontario as being very good to good over 93% of the time.

Since 2003, monitoring has continued and more data has been compiled and will be made available for the information of the residents of the area of Sault Ste Marie, Ontario-Michigan. The informal consultation group will continue to share air monitoring data and hold semi-annual consultative meetings to review respective monitoring trends in Michigan and Ontario and to update each other on the abatement activities at Algoma Steel Incorporated and other sources of pollution in the transboundary airshed. For more information please see the “Informal Consultation on Local Air Issues in Sault Ste. Marie, Ontario-Michigan under the Canada-United States Air Quality Agreement: Technical Support Document on Air Quality 2001-2003”.